Flight Summary: WB-57F MidCiX – 30 April 2004

Top: Cirrus layers observed above a cumulonimbus cell early in the flight. Bottom: Halo visible in the cirrus with cumulus below.

Purpose of Mission: Sample cirrus under EOS Terra satellite.

General Information

Flight date – 30 April 2004
Flight description – Flight #5, MidCiX mission, Terra validation in cirrus
Flight duration – 6 hours
Crew – Bill Ehrenstrom and Brian Barnett

Flight Summary

The WB-57F successfully sampled the optically thin outflow of an MCC today in conjunction with the Terra overpass. The MCC formed in southern Louisiana during the early morning and produced a cirrus shield that spread northward and thinned throughout the day. The WB-57F intersected this cloud shield northeast of Memphis and established an east-west racetrack, sampling at cloud top and at various levels within the cloud. A spiral up and down was conducted during the approximately one-hour period straddling the overpass.

Flight Profile

- We took off and climbed through a thick, puffy layer from 2500 – 3500 feet. We continued the climb up to FL 450 for the transit to the area of interest.
- At 15:10, we descend down to FL 410. At 15:15, a big storm cell was at about our 2 o'clock that had a tremendous amount of blow-off to the northwest. The main cell topped out about FL 430. The top of the cell cloud had a laminar "cobweb" of cloud covering it, and a thin wisp of cirrus directly over it, following the contour of the storm cell.
- We penetrated the storm blow-off at FL 330, 15:25:25, skimming the top of the cloud, and then found ourselves beneath it. ATC would not allow us to climb into it, but by 15:30:30, the base of the layer had dropped back down to us, but we could only stay in it intermittently.
- At 15:34:30, we were back in the clouds, and two concentric halos were seen. The 22 deg halo was persistent, while the 45 deg halo was intermittent. The ground below and the sky above were both visible the entire time.
- At 15:39, ATC ordered us up to FL 370, which put us out of cloud for a minute, but then we started getting counts right at the top of the cirrus layer. The ground was not visible at this point.
- By 15:50, the layer had thickened up such that the sky was slightly attenuated, and the cloud deck beneath us was barely visible. The 22 deg halo was still visible, but not bright.

- At 16:02, we turned east to start an east/west racetrack, still in the clouds at FL 370. There was a solid deck of clouds beneath us, and the winds were 220 @ 90.
- To prepare for the satellite overpass, we climbed up to FL 410 at 16:26 to start a spiral. We got out of clouds at FL 400.
- We started the spiral down at 16:30:10, entering the clouds at FL 399. The layer we were working was thin enough that the cloud deck beneath us was visible the entire time. We also laid down a thick contrail from ~FL 400 – FL 380.
- We got out of the cirrus layer at FL 340, 16:36. The CAPS instrument and my eyes agreed when we were out of cloud, i.e. when it visually looked like we were out of the cloud, we stopped getting counts.
- We started a spiral up from FL 330 at 16:37:45 and got back in the clouds at FL 340. It was noticed that FL 370 was the optically thickest part of the cloud.
- At FL 400, we were visually out of the cloud, but we still got counts on the CAPS up until FL 409. We then started back down to FL 370 to re-establish our orbit at 16:45.
- We were back into the orbit at FL 370, 16:48. There was a very faint, intermittent 22 deg halo. The sky was moderately attenuated, and the cloud deck beneath us was mostly visible.
- We quickly got ordered by ATC to go to FL 390 at 16:54:30. We noticed we were laying down a thick, persistent contrail. We were skimming the visual top of the cirrus layer, which consisted of faint, unstructured wisps. The wisps were not defined, but more so a very, very thin layer.
- At 17:18, ATC told us we had drifted north due to the winds, so we corrected to south some.
- At 17:52:30, we started down to FL 370, which was the thickest part of the cloud. The sky was moderately attenuated, and the cloud deck beneath us was barely visible. ATC then made us descend to FL 350, which kept us in the cloud.
- At 18:17, we started to head home. We went directly to Memphis, still at FL 350. This put us on a heading of 240 deg, while the winds were 220 deg @ 90.
- We stayed at FL 350 for the transit, as it kept us in cloud. By 18:30, we were slightly below the cirrus layer, but still getting counts from time to time.
- At 18:42, we were out of the cirrus.
- At 18:53:30, we could see there was no more cirrus ahead of us, so we climbed up to FL 450 to help with our ground speed and save some gas.
- Coming back to EFD, we descended into a solid layer at 20:07:48, at 7,000. This was a very wet, puffy layer of clouds that we flew through for several minutes, until we broke out of the bottom of the deck at 2000'.
- Probably due to a gust right after touchdown, we drug the right wingtip. The aircraft was not damaged.

Flight Log

Take off	1433 UTC	**Landing**	2026 UTC

Instrument Failures/Notes/Times

- CAPS was accidentally turned on during taxi. No fail light was present during the usual boot-up. The display was checked after takeoff, and no data was present. I elected to recycle CAPS. OFF – 14:37:10, ON – 14:37:45. Everything looked nominal, and the display worked the entire flight, and had no fail lights.
- Harvard Total Water did not automatically shut down (or at least did not show a fail light around FL 080), so it was shut down manually at 2,000 feet at 20:17:25.
- The CIN instrument was damaged due to impact on the runway when the wingtip was dragged.
- MMS Box: 19:40:30 – 19:44:15, Mach .52
- MMS Pitch: 18:31:55 – 18:32:25, Mach .53
- MMS Yaw: 18:32:30 – 18:33:00, Mach .53
- MMS: We were not willing to shut down pitot heat during flight due to safety concerns, as Paul Bui requested.

Instruments flown: Full Compliment
Preliminary Instrument Notes:
Appears Good: JLH, MMS, CSI, CPI, NEV, SPP, Harvard TW, Harvard WV, CLH, CIN
Problems: VIPS – no data recorded
PIP/2DP – No Data.
CIN – Damaged during wing tip drag – likely repairable.

Nav Data Information

- Nav data is uploaded to the MidCiX website.

Compiled by Brian Barnett and Jay Mace